

A new species of *Dichaea* (Orchidaceae) from the Amazon Region of Brasil^a

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Abstract

An hitherto unknown species of *Dichaea* Lindley was found in the Brazilian Amazon forest. *Dichaea fusca* Valsko, Holland & Krah is similar to *Dichaea rendlei* Gleason, but differs in its vegetative and floral morphology, particularly in the lip.

Résumé

Une nouvelle espèce de *Dichaea* (Orchidaceae) de la région amazonienne du Brésil – Une espèce de *Dichaea* Lindley, inconnue jusqu'ici, a été trouvée dans la forêt amazonienne du Brésil. *Dichaea fusca* Valsko, Holland & Krah est semblable à *Dichaea rendlei* Gleason, mais s'en distingue par sa morphologie, tant végétative que florale, et notamment par son labelle.

Resumo

Nova espécie de *Dichaea* (Orchidaceae) para a Amazônia brasileira – É apresentada uma nova espécie de *Dichaea* Lindley para a Amazônia brasileira. *Dichaea fusca* Valsko, Holanda & Krah é semelhante com *Dichaea rendlei* Gleason, contudo se diferenciam vegetativamente e na morfologia floral, principalmente no labelo.

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Introduction

Orchidaceae are regarded as the largest and most specialized family within the existing angiosperms, with about 800 genera and 24.000 species (Dressler, 2005; Fay & Chase, 2009). On the Brazilian territory, the figures generally accepted are 2451 species within about 240 genera (Barros *et al.*, 2013), of which 709 species and 131 genera occur in the Brazilian Amazon (Silva & Silva, 2004).

The genus *Dichaea* Lindley contains about 100 species (Pupulin, 2007), being the largest genus within the subtribe Zygopetalinae (Chase *et al.*, 2003; Whitten *et al.*, 2005). It is distributed all along the neotropical area, with the largest distribution in Ecuador from where we know 40 taxa (Dodson, 2004). Costa Rica has 29 (Pupulin, 2007) and Brazil, 25 of the *Dichaea* species. Eleven of the Brazilian species are endemic, and 18 are known to occur in the Brazilian Amazon (Barros *et al.*, 2013). Fourteen of these are found in Amazon State (Barros *et al.*, 2013).

The genus was founded in 1833 by John Lindley, with *Dichaea echinocarpa* (O.Swartz) Lindley (= *Dichaea pendula* [Aublet] Cogniaux) as its type. Since the original description by Lindley, quite some authors proposed their own review of the genus (*e.g.* Knowles & Westcott, 1839; Pfitzer, 1889; Kuntze, 1904; Cogniaux, 1904-1906; Schlechter, 1914; Kränzlin, 1923; Pabst & Dungs, 1977; Folsom, 1987; 1996; Senghas, 1996; Pupulin, 2007).

In 1906, Alfred Cogniaux proposed four sections for *Dichaea*: (1) section *Dichaea* with plants that have a pilose ovary and inarticulated leaves, (2) section *Dichaeastrum* with plants that equally showed inarticulated leaved but possessed a glabrous ovary, (3) section *Dichaeopsis* with species generating a glabrous ovary and articulated leaves, and (4) section *Pseudodichaea* comprising the species with articulated leaves and a pilose ovary (Cogniaux, 1904-1906). Although Cogniaux's treatment was limited to the Brazilian species, his sections contained all the combinations later proposed by Knowles & Westcott, Pfitzer, and Kuntze. Pabst & Dungs (1977) divided the Brazilian species of this genus into five groups whereby they used the morphology of the leaves, the ovary, and the labellum.

In the present article, we describe a new species, *Dichaea fusca* which, on the basis of its morphological characteristics, we wish to position within the section *Dichaeopsis* (Cogniaux, 1904-1906) and the group designated as "*D. panamensis*" by Pabst & Dungs (1977).

Materials and methods

We collected within the *Reserva Biológica de Campina* (2°35'25.9"S e 60°01'49.5"W), located at km 44 on the BR174 (road running from Manaus to Boa Vista), close to the *Estação Experimental de Silvicultura Tropical do INPA*, which is located at km 41 of that road. The area of this reserve is 900 ha, with a zone of *campina* (3 ha – grassland), a zone of *campinarana* (150 ha – a type of vegetation high and thin on sandy soil) and a zone of dry land forest (Luizão, 1995). Rainfall in this area is strongest during December-May, with less rain from June through November (Braga, 1977). In this area, the climate type is Afi, according to the Köppen (1931) classification. "Afi" designates a tropical climate practically without winter, with a mean temperature never below 18 °C. The mean temperature and precipitation rates vary all along the year without having a clear differentiation between a "summer" and a "winter" season.

The soil is of this area is nutrient-poor, acid, and is made of sediments dating to the tertiary and the quaternary eras, and made of deposits of dystrophic quartz sand (Ranzani, 1980).

We also collected on the areas belonging to the farms "Colosso" (2° 24' 21" S e 59° 52' 32" W) and "Porto Alegre" (2° 21' 19.19" S e 59° 57' 31.81" W), which are part of the project *Projeto de Dinâmica Biológica de Fragmentos Florestais – PDBFF*. These farms are located at about 80 km to the north of Manaus, within the state of Amazonas. The mean elevation there is 70 to 80 m above sea level, and the soil of this area is clayish. This area has been isolated during the years 1980-1990 (Biergaard *et al.*, 1992), and it is covered by dense rainforest.

Specimens were collected without flower in February 2006 and June/July 2012 and placed into cultivation until they produced flowers. The description and illustration of the new entity was based on living as well as on dried herbarium material. The flowers have were preserved in 70% alcohol and mounted in glycerine-phenol-gelatine on microscopy slides and coverslips for the taxonomic analysis and drawings. The flowers and their segments were illustrated using a stereomicroscope. The terminology used to describe the characteristics of the plant is based on Radford *et al.* (1974), Dressler (1993) and Gonçalves & Lorenzi (2007). Some herbarium specimens have been prepared using the procedure described by Mory *et al.* (1989). The herbarium specimens will be preserved at INPA and EAFM (acronyms in accordance with Thiers, 2013). Specimens preserved at

HUAM (herbarium not indexed of the Federal University of Amazonas) were also studied. A comparative study of the new taxon and the closely related species was made, using material preserved in the above herbaria as well as descriptions available in the literature (e.g. Gleason, 1927; Schweinfurth, 1961).

Results

Dichaea fusca Valsko, Holanda & Krahll, *sp. nov.*

Holotype: BRASIL. Amazonas: Manaus, Projeto de Dinâmica Biológica de Fragmentos Florestais (PDBFF), Fazenda Colosso, 2°24'21"S e 59°52'32"W, J.J.Valsko 107, 15.II.2006, flowered in cultivation 25.XII.2007 (INPA). Paratypes: BRASIL. Amazonas: Manaus, BR 174, KM 45, Reserva Biológica de Campina, 2°35'25.9"S e 60°01'49.5"W, A.H.Krahll & D.R.P.Krahll 404, 30.VI.2012, flowered in cultivation 20.XII.2012 (INPA). BRASIL. Amazonas: Manaus, Projeto de Dinâmica Biológica de Fragmentos Florestais (PDBFF), Fazenda Porto Alegre, 2°21'19.19"S e 59°57'31.81"W, J.J.Valsko 109, 8.VII.2012, flowered in cultivation 17.II.2012 (EAFM).

Haec species Dichaea rendlei Gleason similis est sed foliis minoribus, minus dissitis minusque flexilibus, perianthii segmentis lanceolatis haud ovatis, labelo brevioris et labelli lobos lateralibus brevioribus triangularibusque haud linearibus, differt.

Herba epiphytica, caulis elongatus, suberectus, simplex vel ramosus; folia anguste elliptica, acuta, articulata; inflorescentia simplex, solitaria; sepala petalaeque castanea, labellum album; sepala et petala lanceolata acutaeque, sepala lateralia asymmetrica; labellum anchoriforme apice apiculatum concavumque, margine dentatum, lobis lateralibus triangularis apice acutis retrorsisque; gynostemium labellumque inarticulata.

Epiphytic, caespitose plant; roots 1.6-2.1 mm diam., whitish, thick, glabrous, basal or emerging from ramifications; stem 43.2-109.1 mm long, ca. 0.95 mm diam., elongated, terete, sub-erect, simple or ramified, covered with the leaf sheaths; leaf sheaths ca. 4.6 × 1.3 mm, imbricating, superposed, glabrous, deep green to entirely brown; leaves ca. 12.3 × 2.5 mm, with weak size variability along the stem, narrowly elliptic, acute at the apex, rounded at the base, laminae lax, glabrous, deciduous, articulated to the leaf sheath, margin entire, deep green to entirely brown; inflorescence ca. 8.2 mm long, simple, solitary, lateral, emerging from the

axis of the leaf sheaths, peduncle ca. 4.6 mm long, glabrous, with 2 bracts at the base, bracts tubular, acute, glabrous, margins entire, cream to yellowish; floral bracts 2, tubular, glabrous, cream to yellowish, margins entire, outer bract ca. 3.5×1.2 mm, inner bract 3.7×1.2 mm; pedicel and ovary ca. 2.0×0.75 mm, glabrous, terete; sepals and petals brown, lip white, gynostemium cream greenish with purplish spots around the stigma, anther purplish, producing a sweet scent during the day; dorsal sepal 4.9×1.7 mm, lanceolate, acute, rounded at base, glabrous, symmetrical, margins entire; petals ca. 4.1×1.7 mm, lanceolate, acute, rounded at base, glabrous, symmetrical, margins entire; lateral sepals ca. 5.6×2.0 mm, lanceolate, acute, rounded at base, glabrous, asymmetrical, margins entire; lip ca. 3.5×3.25 mm, 3-lobed; hypochile 1.7 mm long, ca. 0.7 mm broad at base and ca. 2 mm at the medium, symmetrical, margin denticulate; epichile ca. 1.5×3.1 mm, triangular, bilaterally symmetrical, apiculate and concave at the apex; lateral lobes ca. 2.7×1.6 mm, triangular, falcate, bilaterally asymmetrical, acute; gynostemium ca. 1.1×0.75 mm, non-articulate to the lip, erected, glabrous; anther cap ca. 1.8×1.5 mm, orbicular, symmetrical, glabrous, margin entire; pollinia 4, arranged in 2 pairs that are slightly different, ca. 0.5 mm diam., yellow, orbicular, stipe triangular in back view, viscidium elliptic; fruit not observed. Fig. 1 & 2.

Etymology: the specific epithet was chosen in reference to the deep brown coloration of the sepals and petals, a coloration that is also present in some of the leaves.

Distribution and habitat: *Dichaea fusca* occurs in campinara forest as well as in dense rainforest, at 70-80 m elevation. It was observed in the reserves of *Fazenda Colosso* and *Fazenda Porto Alegre* where the soil is clayish, and in the *Reserva Biológica da Campina*, where the soil is sandy. It grows about 1.7 m above the ground, epiphytic on shrubs, in areas that are near flowing water and have a low luminosity.

Phenology and pollination: flowering occurs during the months with high precipitation, from December to May. We assume that the plants are pollinated by males of Euglossine bees, which collect aromatic compounds produced by the osmophores of the labellum, as it has been reported for other species of *Dichaea* (Pupulin, 2007).

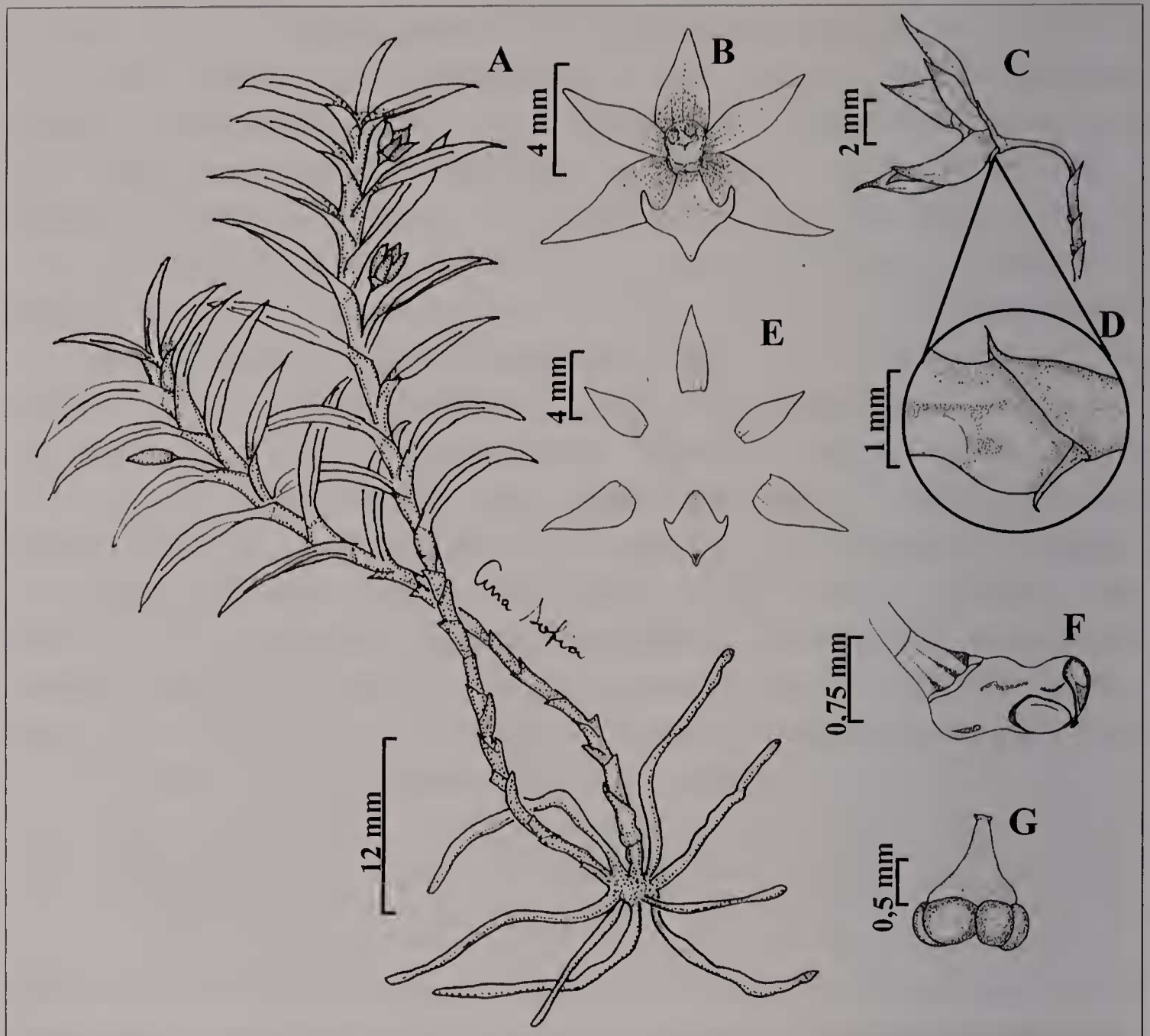


Fig. 1: *Dichaea fusca* Valsko, Holanda & Krah

A. general habit of the plant – B. Flower (front view) – C. Flower (side view) – D. detail of flower bracts – E. Flower segments – F. Pollinia

Discussion

Dichaea fusca presents some morphological features that place it within the section *Dichaeopsis* (ovary glabrous and leaf articulate). Following the criteria from Pabst & Dungs (1977), the new species fits well within the “*D. panamensis* Alliance” the members of which always present articulate, deciduous leaves, a glabrous ovary and a lip with a narrow, long base. The species is closely related to *Dichaea rendlei* Gleason (Gleason, 1927), but differs by its floral and vegetative morphology. *D. rendlei* presents larger, more spaced and more flexible leaves; *D. fusca* presents lanceolate flower segments while they are ovate in *D. rendlei*. Furthermore, in *D. fusca*, the lip,

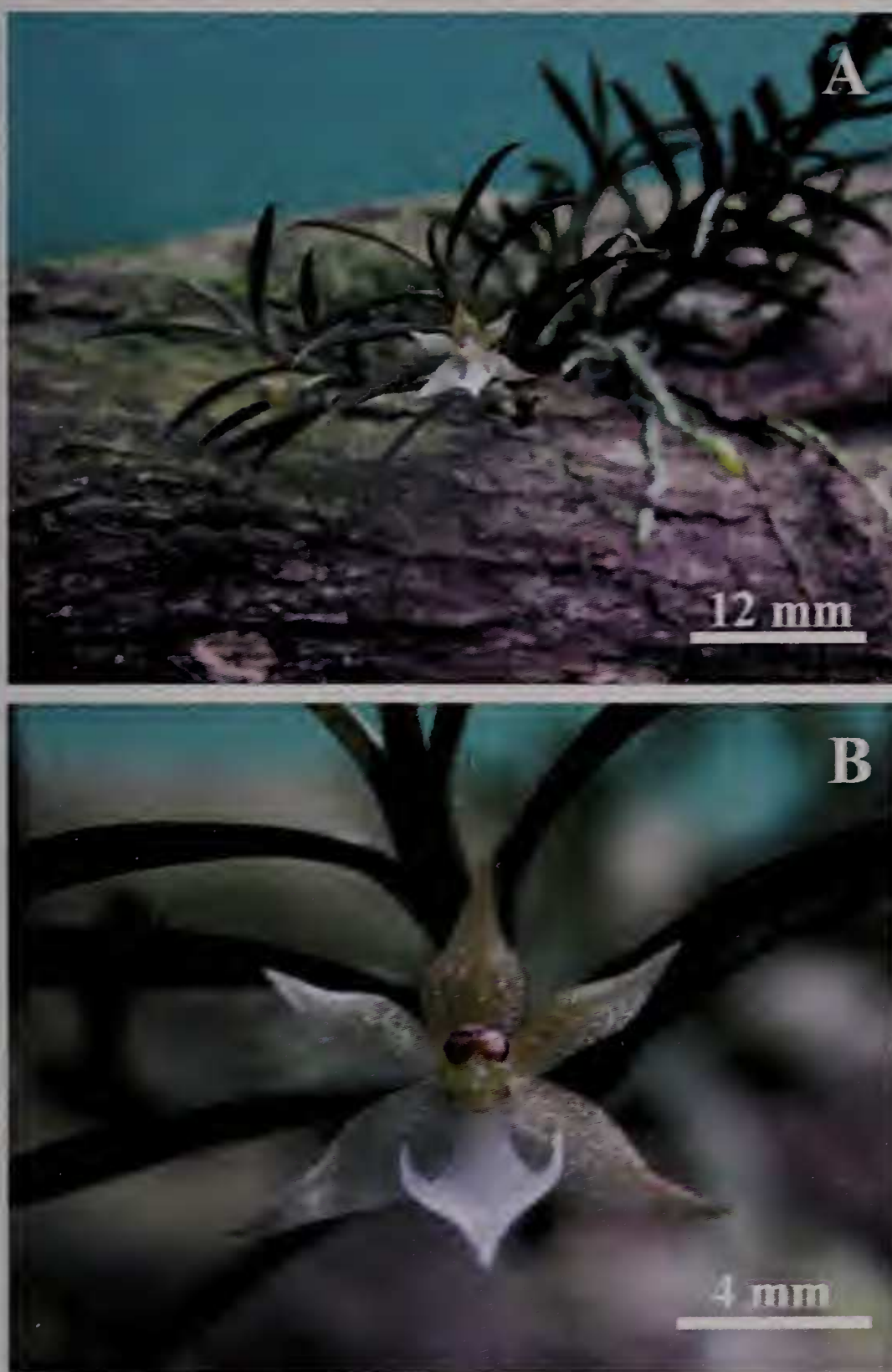


Fig. 2: *Dichaea fusca* Valsko, Holanda & Krahll

A. General habit – B. Flower detail

as well as its lateral lobes, are shorter; the lateral lobes are triangular (versus linear in *D. rendlei*). In the latter, the gynostemium does not present the purplish colour observed in *D. fusca*.

The new taxon has been erroneously identified as *Dichaea tenuis* C. Schweinfurth on herbarium sheets at INPA and HUAM. *Dichaea tenuis*, however, is distinguished by terete and coriaceous leaves, globular flowers with a lip broadly rounded and apiculate in the middle (Schweinfurth,

1961). According to the criteria from Cogniaux (1904-1906) and Pabst & Dungs (1977), *Dichaea fusca*, *D. rendlei* and *D. tenuis* belong into the same section and alliance.

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